U.S. ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL ENFORCEMENT SUPPORT
AT
HAZARDOUS WASTE SITES

TES IV
CONTRACT #68-01-7351
WORK ASSIGNMENT NO. 826

REVIEW OF THE HILLMAN PROPERTIES NORTHWEST RESPONSE TO THE U.S. EPA CLOSURE PLAN MODIFICATION REQUEST

TETRA TECH, INC.
FOR
JACOBS ENGINEERING GROUP, INC.
PROJECT NUMBER: R10001
TC-3621-47

SEPTEMBER 1989

CONTENTS

1.0 INTRODUCTION

The following review pertains to the Cascade Tempering Waste Disposal Area - Building 5 in Vancouver, Washington. The site is owned by Hillman Properties Northwest (HPN) and is part of the Columbia Industrial Park in Vancouver. HPN has submitted a soil contamination investigative report (December 1988) and a closure plan (January 1989) for the site to U.S. EPA Region X for review. Tetra Tech reviewed both documents under TES Work Assignment R10001 for technical and regulatory deficiencies for U.S. EPA Region X. U.S. EPA subsequently submitted a letter to HPN to inform them of the closure plan and investigative deficiencies (U.S. EPA 1989, see Attachment 1). HPN and their consultant, Dames and Moore (DM), responded to the EPA comments in a letter dated 24 May 1989 (Dames and Moore 1989, see Attachment 2). This report is a review of the HPN response letter to U.S. EPA Region X. The following comments refer to areas of concern with the site characterization, closure plan deficiencies, and groundwater monitoring network deficiencies.

2.0 GENERAL COMMENTS

Review of the U.S. EPA letter dated 10 April 1989 (Attachment 1) and the Hillman Properties Northwest response letter dated 24 May 1989 (Attachment 2), indicates that many of the key technical site characterization issues have not been addressed. Both technical reviews performed by Tetra Tech (i.e., December 1988, January 1989) stressed that the site characterization was incomplete. Before a closure plan is prepared or a post-closure groundwater monitoring network can be properly evaluated, the site must be adequately characterized.

3.0 SPECIFIC COMMENTS

Specific comments regarding the responses by Hillman Properties Northwest to the U.S EPA closure plan deficiencies letter are provided below.

3.1 CLOSURE PLAN CLARIFICATIONS

Comments 1 through 7 submitted by HPN satisfy the informational requirements in 40 CFR 265.112(b) and the technical deficiencies outlined in the U.S. EPA letter. Although no estimates of hazardous waste volumes were provided for the facility, the closure plan does specify the types of waste generated and handled at the facility and details the contaminants of concern at the site. One soil sample from grid area A-5 was collected to document that the area had been decontaminated to background levels for lead (i.e., 1.7 ppm).

The clarifications provided in the response should be incorporated into a final closure plan document for the site and submitted to U.S. EPA Region X for approval.

3.2 GROUNDWATER MONITORING NETWORK

Comments 8-1 through 8-7 submitted address issues regarding subsurface conditions and contaminant migration as requested in the U.S. EPA letter. No additional fieldwork or data have been presented by HPN to support their conclusions regarding the site except for a single round of water levels collected from six of the seven wells on 2 May 1989. However, they did offer conclusions from another study north of the site to support their interpretations. Each response submitted by HDN will be discussed independently in the following paragraphs. Conclusions and recommendations will follow.

Comment 8-1 stated that the CT wells (i.e., shallow monitoring wells) were placed upgradient (one well) and downgradient (three wells) of the waste disposal area to monitor the fill material. The AGI series wells (i.e., deeper monitoring wells) were designed to monitor the sand aquifer at upgradient (one well) and downgradient (three wells) locations. HPN discussed the ability of the well network to monitor the potentially contaminated area in later comments.

In Comment 8-2, HPN assumed the silty gravel soil unit beneath the site to be laterally extensive north, northeast and west of Building 5, based on a study performed north of the site. No subsurface soil, boring log or well log information was presented to document their conclusion. Furthermore, the silty gravel soil unit east of the disposal area was not addressed as requested.

Comment 8-3 addressed whether potential buried utility lines in the disposal area act as contaminant migration pathways. HPN provided a utility map (Attachment 2) for the site but failed to discuss utilities or utility trenches as potential migration pathways. However, after reviewing the utility map supplied, the potential for contaminant migration via utility lines, sewers, or trenches appears minimal.

In Comment 8-4, HPN says that the sand aquifer is the uppermost aquifer. HPN states that the hydraulic fill soil unit is not saturated. Tetra Tech agrees with this assessment. Reported water level measurements collected during the wet and dry seasons were all below the described base of the fill, indicating that Wells CT-2 and CT-3 are acting as sumps. It has yet to be determined whether Well CT-4 is installed in an area where the hydraulic fill unit is hydraulically connected with the sand aquifer unit. Groundwater elevation data suggest this may be the case.

Comment 8-5 responds to the potential for contamination migration along the hydraulic fill/silty gravel contact. According to HPN, the migration potential is minimal because the fill is not saturated, migration of contaminants will be primarily along vertical pathways, and the silt

content of the materials will retard contaminant migration by absorption. No data were presented to indicate the silt contents or the absorption capacities of the soil units in question. Furthermore, during the winter and early spring months, when precipitation and infiltration is greatest, the perched water will likely flow laterally along the sloping fill/silty gravel contact to the north (towards Well AG-1) and west, as well as along vertical pathways. Tetra Tech disagrees with the HPN assessment based on the data and logic presented.

Comment 8-6 describes the direction of groundwater flow across the site during periods of seasonal and tidal variations. According to DM groundwater elevations collected 2 May 1989 indicated that the flow within the sand aquifer was to the west. Plate 11 of the AGI report (1986) demonstrates the groundwater flow direction in the sand aquifer to be in a southwest orientation (Comment 8-1). According to HPN, a predominant south/southeast groundwater flow direction occurs at a site just north of the Cascade Tempering site. HPN further explains that the site is likely affected by river stage fluctuation as is the Frontier Hard Chrome site (just north). The apparent conclusion of the HPN response is that the water levels collected on 2 May 1989 at the Cascade Tempering site do not define the average flow directions of the aquifer because the elevations were collected during a seasonal period of increased river stage levels. HPN contends that the primary groundwater flow direction and the contaminant migration direction at the site is to the south. Tetra Tech disagrees with the assumption that groundwater predominantly flows to the south from the site because the existing data is insufficient to define aquifer responses to river level fluctuations at this time. Furthermore, groundwater flow reversals may occur across the site during periods of rapid increases in river level (e.g., flood events).

Comment 8-7 describes the general characteristics of the sand aquifer beneath the site. The general description of the aquifer appears accurate. However, amounts of data collected from this aquifer at the site have been too limited to accurately define actual aquifer characteristics, including aquifer thickness estimates.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on Tetra Tech's review of these responses and other documents (previously reviewed by Tetra Tech) pertaining to the Cascade Tempering-Building 5 disposal site, characterization of the site contamination and aquifer properties are insufficient to meet the requirements for groundwater detection monitoring as outlined in 40 CFR 265 Subpart F. The facility has not adequately defined the perimeter of the land disposal area or established representative background levels of contamination. The facility has not conclusively demonstrated with data that Well AGI-1, the background/up-gradient well, is not affected by contaminants migrating from the facility and that the well is capable of producing representative background water samples for the duration of monitoring activities.

The following data gaps need to be addressed before an adequate groundwater monitoring network can be installed:

- The potential sources of contamination and areas potentially impacted by contamination need to be reevaluated as discussed in Section 3.1 (Site Characterization) of the Tetra Tech (1989) report.

- Background concentrations of contamination need to be reevaluated. Results obtained during earlier investigations do not appear to be representative of natural background conditions. Background soil samples should be collected in remote upgradient areas, unaffected by heavy industry. The samples collected should be from soil units similar to those found on-site.

- A boring and monitoring well should be drilled and installed east of the designated disposal area to define the nature, areal extent, and geometry of the silty gravel soil unit east of the disposal area. The well should be screened in the sand aquifer and capable of yielding a representative groundwater sample. The boring should be drilled with a hollow-stem auger capable of yielding undisturbed soil samples ahead of the lead auger flight. The soil samples collected should be selectively analyzed for chemical and geotechnical parameters from each of the three designated soil units. Geotechnical parameters selected may include grain size analysis (determination of clay and silt content of the soils) and hydraulic conductivity data.

- Additional subsurface soil information (e.g., boring logs or analytical data) should be provided by Hillman Properties Northwest to document the characteristics of the silty gravel soil unit north, northeast, and west of the site. The information may already exist from other investigations performed in the vicinity of the site.

- Groundwater flow directions and velocities should be established for the sand aquifer beneath the site. Water levels should be collected from the monitoring wells on a monthly (or quarterly) basis to establish accurate groundwater flow directions beneath the site. The data collected should reflect daily tidal fluctuations as well as seasonal changes. At a minimum, each monitoring well should be tested (i.e., slug tests, baildown tests, or single well pump tests) to establish relative groundwater velocity data.

- Groundwater sampling of the monitoring wells on-site should be performed at least two more times (i.e., summer and winter) to help define baseline groundwater quality conditions of the aquifer during seasonal variations. The analytical

parameters list should be expanded to include the analysis of total lead and total cadmium. It may also be appropriate to analyze for additional potential metal contaminants (i.e., cobalt, zirconium, chromium, nickel, antimony, and selenium). U.S. EPA approved sampling and analysis protocols should be implemented during the sampling events.

- The data collected during the additional investigation(s) should be sufficient to establish Well AGI-1 as "upgradient" for post-closure detection monitoring.

Following the completion of a site assessment to address the data gaps mentioned above, several additional RCRA requirements must be met prior to the initiation of groundwater detection monitoring. The following items were identified:

- A sampling and analysis plan must be developed in accordance with 40 CFR Subpart F.

- The groundwater monitoring program must include the location(s) for the monitoring wells to be used in detection monitoring. A discussion of the rationale for locating the monitoring wells must be included.

- Sampling frequency should be discussed within the sampling and analysis plan and meet requirements established in 40 CFR 265.92.

- Analytical variables must be defined and included within the sampling and analysis plan. At a minimum, the variables selected should include total and dissolved lead and cadmium in addition to the parameters identified in 40 CFR 265.92.

5.0 REFERENCES

Applied Geotechnology Inc. 1989. Soil contamination investigation Building 5, Columbia Industrial Park, Vancouver, WA. Applied Geotechnology Inc., Bellevue, WA. 125pp.

Dames and Moore. 24 May 1989. Personal Communication (letter to Mr. C.A. Shenk, U.S EPA, RCRA Compliance Section). Dames and Moore, Portland, OR. 3pp + attachments.

Tetra Tech Inc. 1988. Draft RCRA closure plan review, Building 5 waste disposal area, Columbia Industrial Park, Vancouver WA. Tetra Tech Inc., Bellevue, WA. 4pp + attachment.

Tetra Tech Inc. 1989. Final report, technical evaluation of the hydrogeologic investigation, Cascade Tempering, Vancouver, WA. Tetra Tech Inc., Bellevue, WA. 14pp.

U.S. Environmental Protection Agency. 10 April 1989. Personal Communication (letter to Mr. D. Hardesty, Hillman Properties Northwest). U.S. EPA Region X, Seattle, WA. 2pp.

ATTACHMENT 1

U.S. EPA REGION X LETTER TO HILLMAN PROPERTIES NORTHWEST

CASCADE TEMPERING DISPOSAL AREA-BUILDING 5 SITE
VANCOUVER, WASHINGTON

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

APR 10 1989

REPLY TO ATTN OF: HW-112

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Doug Hardesty
Hillman Properties Northwest
2000 E. Columbia Way
Vancouver, Washington 98661

Re: Notice of Deficiency for Building #5 Closure Plan

Dear Mr. Hardesty:

The U.S. Environmental Protection Agency (EPA) Region 10, Waste Management Branch and Washington Operations Office have reviewed the closure plan submitted by Hillman Properties Northwest for performance of the Resource Conservation and Recovery Act (RCRA) at Building 5 in the Columbia Industrial Park, Vancouver, Washington. This review was performed pursuant to Consent Agreement and Final Order docket number 1088-01-01-3008 and 40 CFR 265 Subpart G. In addition, an in-depth review of the existing groundwater monitoring system for the site was conducted to assess its adequacy for certifying clean closure. This was done in accordance with 40 CFR 265 Subpart F. Both reviews uncovered deficiencies which must be corrected. We request that the closure plan be modified to fully address the following deficiencies.

- An estimate of the maximum inventory of hazardous wastes was not provided.

- The plan did not identify the transporter or the treatment or disposal facility that would be used should it be necessary to remove material from the site during closure.

- The plan does not contain a discussion of back filling procedures should removal of soil be necessary.

- The plan did not discuss site security during closure.

- A topographic map of the site was not provided with the plan.

- According to the plan, equipment decontamination rinsewaters will be discharged to the storm sewer. A sampling plan for sampling of the rinsates prior to discharge was not included in the closure plan.

- In the site history provided in the closure plan, Table 1-1 indicates that AGI found 1606 ppm of lead in grid A-5. Even though this area was excavated, this grid should be sampled again to confirm that it is clean.

- Current information provided to EPA on the groundwater monitoring system does not answer the following questions:

  1. What criteria was used in selecting well placement and does the well network adequately cover the potentially contaminated area?

  2. What is the nature, areal extent, and geometry of the silty gravel aquitard to the north and east of the site?

  3. Where are the buried utility lines crossing the land disposal area and what role do these lines play in contaminant migration at the site?

  4. Is the hydraulic fill aquifer the uppermost aquifer?

  5. What is the potential for contaminant migration along the fill/silty gravel contact?

  6. What is the direction of groundwater flow across the site during high water periods (winter and spring)?

  7. What is the total thickness of the sand aquifer?

This information is needed to determine the adequacy of the existing system for sampling of the groundwater to certify clean closure.

The revised closure plan should be submitted to EPA, Region 10, within 45 days of your receipt of this letter.

If you have any questions contact Jack Boller at (206) 753-9428.

All submittals must be sent to:

C.A. Shenk, Chief
RCRA Compliance Section
Environmental Protection Agency
1200 Sixth Avenue (HW-112)
Seattle, Washington 98101

Sincerely,

Michael F. Gearheard, Chief
Waste Management Branch

ATTACHMENT 2

HILLMAN PROPERTIES NORTHWEST RESPONSE LETTER TO
U.S. EPA REGION X

CASCADE TEMPERING DISPOSAL AREA BUILDING 5 SITE
VANCOUVER, WASHINGTON

DAMES & MOORE
1220 S.W. MORRISON ST., SUITE 404, PORTLAND, OREGON 97205 (503) 223-7088

May 24, 1989

Environmental Protection Agency
RCRA Compliance Section
1200 Sixth Avenue (HW-112)
Vancouver, Washington 98661

Attention: Mr. C. A. Shenk

Response to EPA Comments
Columbia Industrial Park Closure Plan
Vancouver, Washington

Dear Mr. Shenk,

This letter includes clarifications of the deficiencies in the Building No. 5 Closure Plan noted by the EPA in a letter dated April 10, 1989. The deficiencies will be numbered and addressed in order.

The EPA requested clarifications are as follows:

1. The maximum inventory of hazardous waste can not be determined from the available information. The available records of Cascade Temperings waste disposal practices and production process would not provide meaningful estimates of this volume.

2. A qualified waste transporter will be selected after closure plan acceptance and with consideration of availability and cost. The disposal facility will be determined based on the excavated soils designation. Non-dangerous wastes will be disposed locally at a minimum function design landfill such as the Circle C landfill. Dangerous wastes will be disposed of at a either CSSI-Arlington or ESI-Idaho.

3. Backfill procedures will be conducted to achieve the goals specified in section 1.5.7 of the Closure Plan. Imported clean fill will be placed and compacted to specifications required for use as a parking and truck loading area.

4. The area affected by excavation will be barricaded and surrounded by caution tape. The industrial parks 24 hour security service will be alerted to prevent entry to this area.

5. The topography of the affected area is essentially flat lying. Spot elevations are indicated on the attached utilities plan (Figure 1).

6. Equipment will be decontaminated in a bermed tarp covered area. The waste water will be decanted to a drum as needed and sampled prior to disposal. This will increase sample analysis and materials costs approximately $450.

7. In response to EPA concerns, a sample was collected from a depth of two feet in grid area A-5 on May 2, 1989. A total lead concentration of 1.7 ppm was determined and demonstrates that the contaminated soil has been removed. Background levels for lead in these soils range from 32 to 135 ppm as discribed in Section 1.5.2.1 of the Closure Plan. The laboratory report is attached.

8-1. In consultation with the WDOE it was decided that monitoring wells would be placed at one upgradient and three downgradient locations. The first wells (CT-2 to CT-4) were located with the concurrence of DOE representative Joanne Chance and designed to monitor the fill material. The second set of wells (AGI-1 to AGI-4) were designed to monitor the sand aquifer. Plate 11 in the AGI report demonstrates that these wells satisfy the one up- and three downgradient criterion. Additionally, this flow direction is reported as dominant at the Frontier Hard Chrome site to the north. Further discussion of the adequacy of the network will be included with clarifications of deficiencies 8-2, 8-4, 8-5, and 8-6.

8-2. The lithologic information obtained during investigation of Frontier Hard Chrome (approximately 1500 feet north of Building 5) indicates that the silty gravel unit is laterally extensive north, northeast and west of Building 5. It can be assumed to extend to the east and south as well. At Frontier Hard Chrome, this unit is described as being of relatively low permeability while an overlying silt and clay unit is considered an aquitard. At Building 5, the conditions appear similar because the silty gravel does not perch water in the overlying fill. This unit can, therefore, be considered an aquitard only in a relative sense at this site.

8-3. A utility plan for the industrial park has been reviewed. A copy of the relevant section is attached (Figure 1). Water and gas lines are present on the east and west sides of the waste disposal area respectively but do not cross this area directly. Additionally, no evidence of abandoned utilities was noted during the investigations or excavations of affected soils.

8-4. Water level measurements taken in shallow wells CT-2 and CT-3 in February 1985, July 1986 and May 1989 (Table 1) all indicate that the fill was not saturated and, therefore, should not be considered the uppermost aquifer. These measurements represent wet and dry season water levels all of which are below the described base of the fill.

8.5. There is little potential for horizontal contamination migration along the fill/silty gravel contact in that the fill is not saturated.

Infiltration and migration of contaminants will be primarily along vertical pathways. Ground water is assumed to be the primary carrier of any contaminants. Additionally, the silt content of the material may retard migration of lead by absorption.

8-6. Water levels measured in the sand aquifer at the site on May 2nd 1989 indicate water levels approximately two and a half feet higher than the July, 1986 water levels and a westward gradient. A correlation between aquifer water levels and Columbia River stage is described at Frontier Hard Chrome for this aquifer. River stage is shown to have a dominant effect on aquifer water levels and gradients. However, the predominant slope of the potentiometric surface is reported to be to the south-southeast. The average river stage is highest during May and June which indicates that gradients measured during these months may not define average flow direction and, therefore, contaminant migration direction. The primary contaminant migration direction at the site is considered to be to the south.

8-7. The total thickness of the sand aquifer at the site is not known. The alluvial material present in the flood plain of the Columbia River generally contains interbeds, lenses, and mixtures of gravel, sand, silt and clay. This material character is described near the site at Frontier Hard Chrome. Vertical groundwater flow and, therefore, vertical contaminant dispersion within the saturated zone is limited by the layered nature of this material. Additionally, a vertical ground-water gradient which would act to drive water downward was not measured at Frontier Chrome. The ground-water samples to be obtained at the site are, therefore, considered representative of this aquifer.

We expect that this information addresses the concerns of the EPA for these deficiencies. If you have any questions please contact me directly.

Yours very truly,

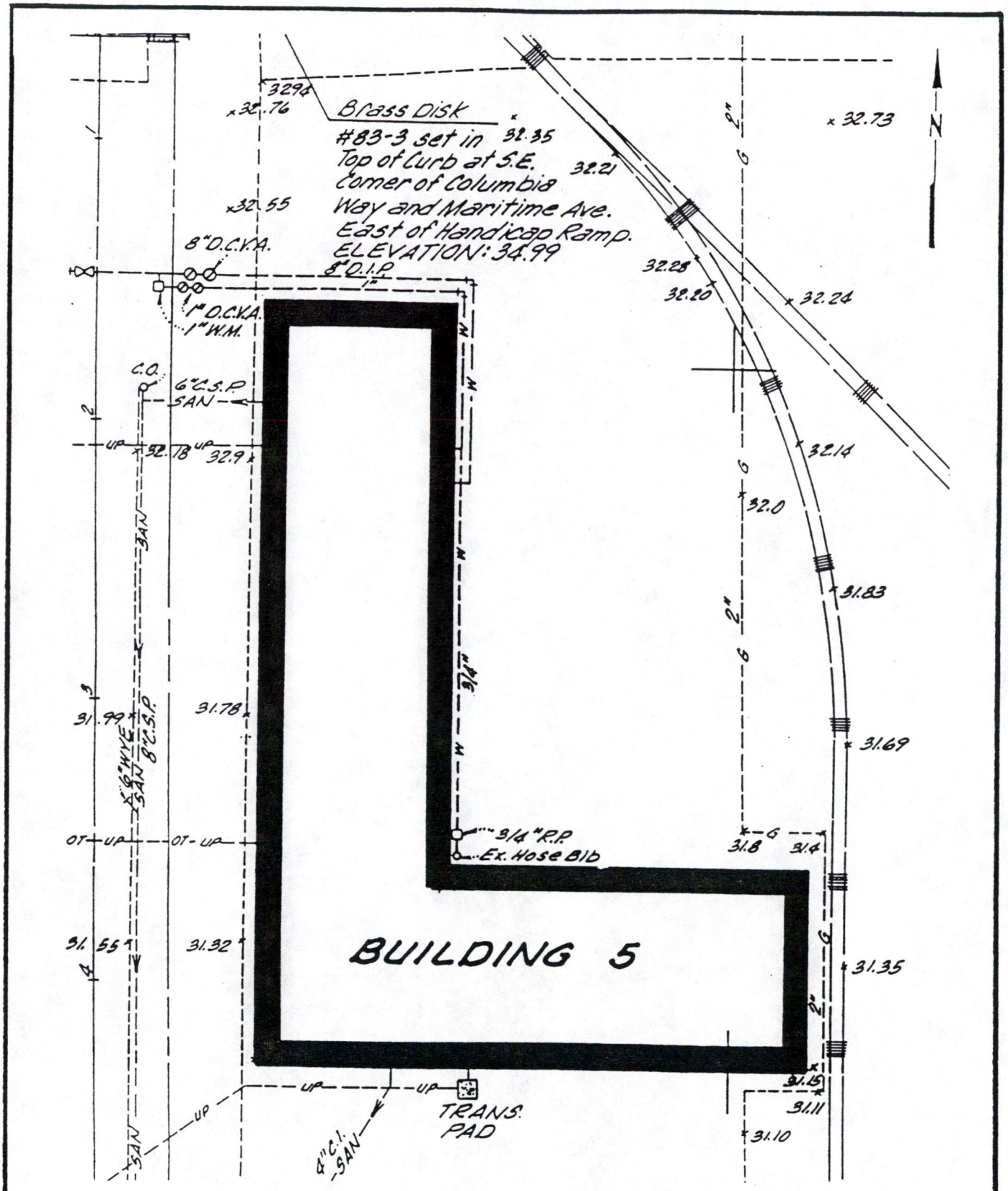
DAMES & MOORE

Kim L. Marcus

Kim L. Marcus,
Senior Geologist

WD44/Hill
DRD:cad
17809-001-005

cc: Jack Boller, EPA



UTILITY PLAN

COLUMBIA INDUSTRIAL PARK, BUILDING 5 WASTE DISPOSAL AREA CLOSURE

DAMES & MOORE
MAY 1989

JOB NO: 17809-002-001

HILLMAN PROPERTIES
VANCOUVER, WASHINGTON
JOB NO: 17809-001

TABLE 1
WATER LEVELS
May 2, 1989

WELL TESTED	TIME	DEPTH to WATER (in feet)	WATER LEVEL ELEVATION*
CT-2	12:38	11.58	14.56
CT-3	12:43	8.42	17.46
CT-4	13:03	21.89	5.33
AGI-1	13:34	22.97	2.36
AGI-2	12:34	23.05	2.33
AGI-3	12:46	22.53	2.27
AGI-4	--	--	--

NOTE: * = Relative to AGI Arbitrary Site Datum

Analytical Technologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D. 905057

May 10, 1989

Dames & Moore
1220 S.W. Morrison Street, Suite 404
Portland, Oregon 97205

Project No: 17809-001

Project Name: Hillman Prop.

Attention: Dennis Dykes

On May 4, 1989, Analytical Technologies, Inc. received one soil sample for analyses. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference.

The results of these analyses and the quality control data are enclosed.

For: Marcilen Lindsey
Senior Project Manager

Richard M. Amano
Laboratory Manager

ML:lap

Analytical Technologies, Inc.

ATI I.D. 905057

ANALYTICAL SCHEDULE

CLIENT: DAMES & MOORE
PROJECT NAME: HILLMAN PROP.

PROJECT NO.: 17809-001

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PERCENT MOISTURE	GRAVIMETRIC	METHOD 7-2.2 in Methods of Soil Analysis, American Society of Agronomy
LEAD	ICAP	EPA 6010

NOTE: All soil sample results were calculated in dry weight.

Analytical Technologies, Inc.

CLIENT : DAMES & MOORE-PORTLAND DATE RECEIVED : 05/04/8
PROJECT # : 17809-001
PROJECT NAME : HILLMAN PROP. REPORT DATE : 05/10/8
ATI I.D. : 905057

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTE
01	CP-A5	SOIL	05/02/8

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from t date of this report. If an extended storage period is required, please conta our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 905057

CLIENT : DAMES & MOORE-PORTLAND
PROJECT # : 17809-001
PROJECT NAME : HILLMAN PROP.

DATE RECEIVED : 05/04/8
REPORT DATE : 05/10/8

PARAMETER	UNITS	01
% MOISTURE	%	5.7

Analytical Technologies, Inc. GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : DAMES & MOORE-PORTLAND
PROJECT # : 17809-001
PROJECT NAME : HILLMAN PROP. ATI I.D. : 905057

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% RE
MOISTURE (%)		90508201	17.2	17.2	0	N/A	N/A	N/

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 1$$

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 905057

CLIENT : DAMES & MOORE-PORTLAND
PROJECT # : 17809-001
PROJECT NAME : HILLMAN PROP.

DATE RECEIVED : 05/04/89
REPORT DATE : 05/10/89

PARAMETER	UNITS	01
LEAD	MG/KG	1.7

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : DAMES & MOORE-PORTLAND
PROJECT # : 17809-001
PROJECT NAME : HILLMAN PROP. ATI I.D. : 905057

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% RE
LEAD	MG/KG	90508404	4.9	5.4	10	50.6	53.1	86

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times$$

557-2280 Fax 417

DAMES & MOORE

1220 S.W. Morrison Street, Suite 404 • Portland, Oregon 97205 • (503) 228-7688

Chain of Custody

Date 5/2/89 Page 1 of 1

Project Number: 18809 - 001
Project Manager: Dennis Dykes
Laboratory: ATI
Turn around time:

Sampler's Initials: JAJ
Sampler's Signature: Jean A. Jenkins

Sample ID	Date	Time	Matrix
CP - A5	5/2/89	13:45	Sand

Analysis Request

Sample ID	Volatile Organics 624/8240 (GC/MS)	Halogenated Volatiles 601/8010	Aromatic Volatiles 602/8020	Base/Neutral/Acids 625/8270 (GC/MS)	BTX 602/8015	Polycyclic Aromatic Hydrocarbons 610/8310	Pesticides/PCBs 608/8080	Metals - Total Lead			Priority Pollutant Metals (13)	EP TOX Metals (8)			Comments/ Instructions	Number of Containers
CP - A5								X								

Special Instructions/Comments:

Relinquished by:

(Sig) Jean A. Jenkins
(Printed) Jean A. Jenkins
(Company) Dames & Moore
(Time) 2:05 (Date) 5/3/89

Received by (lab):

(Sig) _____
(Printed) _____
(Company) _____
(Time) _____ (Date) _____

Sample Receipt

Total no. of containers:
Chain of custody seals:
Rec'd good condition/cold:
Conforms to record:

Lab number: